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ABSTRACT

It is academically advantageous to mix students from different departments and different areas of concentration in upper level college writing courses. For such programs to be successful, faculty members in all the disciplines must commit their time and efforts to them. Isolating students in disciplines is undesirable, since it will not prepare them to explain their work to the public at large, an important goal of technical writing. Instead, they will be writing for people in their own field who already know the information they are writing about. Writing for people in other disciplines has the benefit of forcing students to examine their own understandings of concepts and terminology in their fields as they try to communicate about them to uninformed readers. Other advantages of mixing disciplines are that students learn to see the world from different perspectives and that teachers can learn from mixing with those in other disciplines. (GW)

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MIX STUDENT DISCIPLINES IN TECHNICAL WRITING COURSES

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I have been asked to discuss and to take a stand on the following question:

Is it desirable to arrange courses in technical writing for students of a single or particular discipline, or is it better to mix students with a variety of specialties in the same technical writing course? In other words, is it better to restrict technical writing courses, setting aside one section, or one course, for students of Physics, another for students of Biology, and still another for students of Psychology, and so on? Or is it better to have a stew--some Chemistry, some Geology, some Sociology, with dashes of Astronomy and Anthropology for seasoning?

This struck me as an interesting question. Moreover it is an especially pertinent one, because in January 1978 the faculty of the College of Literature, Science, and the Arts of the University of Michigan, across the campus from my own College of Engineering, approved a proposal submitted by their college-wide committee, the English Composition Board, for a new composition requirement for all of their students.

Freshmen entering the College of Literature, Science, and the Arts will now be required to take one course in Freshman Composition, unless a writing sample administered at admission exempts them from it, or reveals such deficiencies that they must take a remedial writing course first.

This, of course, is not an earthshaking development. However, the second part of the composition requirement is more interesting. In addition to Freshman Composition, each student must take a "course or program" in writing in his own department of specialization or area of concentration in his junior or senior year. In the physical, biological, and social sciences these specialized writing courses or programs will almost inevitably come to be labeled "scientific writing" or "technical writing."

Precisely how these junior or senior level writing "courses or programs" will be administered, organized, or taught has yet to be settled. The College of Literature, Science, and the Arts has approved the principle, but the working details remain to be settled. At the same time other universities in the State of Michigan have adopted, or are considering, similar requirements.

Probably because the College of Engineering led the way when it adopted our Humanities Department proposal for a similar senior-level composition and speech requirement ten years ago in 1968, Professor Dwight Stevenson and I were invited to join a sub-committee of the English Composition Board, a committee chaired by Professor Bernard Van't Hul and called the ECB Consulting Committee.

In my capacity as consultant I should like to urge the faculty of the

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College of Literature, Science, and the Arts to mix students from different departments and different areas of concentration in these upper-level writing programs as we do in the College of Engineering because I believe it is academically advantageous. But their college satisfies certain conditions which make such mixing possible, and these conditions may not exist at other institutions.

First, I expect that the students in the senior-level writing courses will be experts, or near experts, in their disciplines. If the students are still in the process of learning the terminology and techniques of their trade and have yet to be called upon to combine and synthesize what they have learned, they will be unable to write about it in anything approaching a professional manner. They will still be neophytes and can only produce "neophyte writing", just as they did in Freshman Composition. It has been my experience that only in the senior year do engineering students reach this level of expertise and it seems reasonable that the same would be true of other disciplines.

Second, the College of Literature, Science, and the Arts, like my College of Engineering, is cosmopolitan enough to include many distinct disciplines. If all the students in a college are studying Art, Music, or Pharmacy, I think it would be difficult to find areas of specialization sufficiently different to create groups mixed in any real sense.

Third, I assume that there are senior faculty in these diverse disciplines who are interested in a communication and who wish to have their students capable of writing clearly about the discipline. This is a very important assumption. There may well be senior faculty in a department who say that they are interested in communication, who complain about the writing of their students, and even of the writing of their colleagues, but who are unwilling to commit their own time and effort to trying to do something about it. Money is not important; time is. You can accomplish anything if you can get people to commit their time.

But writing is hard work--at least it is for me, and it certainly is for my students. They often spend hours struggling with a single paragraph of discussion about such things as electrophoresis or a proton recoil telescope. Without the support and reinforcement of the senior faculty in each of the engineering departments, without their willingness to spend time assisting a student with a difficult piece of exposition, without their insistence on the importance of clear writing, engineering students would simply avoid this hard work.

You may be able to secure such support from the faculty of a single discipline, like Chemistry, and this will enable you to form a group composed entirely of Chemistry students. But unless the faculty of other disciplines, such as Physics, Zoology, and Psychology, are also supportive, you simply cannot establish mixed groups of upper-level writing students. Fortunately, the faculty of the College of Literature, Science, and the Arts voted overwhelmingly for this new writing requirement and seem ready to help.

Given these necessary conditions, I must make an important assumption about the goals of the upper level writing courses that this faculty has so recently approved. If you, or the faculty of the College of Literature, Science, and the Arts, disagree with this assumption, then my argument for mixing students in "technical writing" courses is in trouble.

I assume that the ability to communicate in writing or in speech means the ability to explain to the public at large what you set out to do, the ability to convince them that you did it well, and the ability to persuade them that it was worth doing in the first place. If this phrasing has a familiar ring, you may recognize it as stemming from the three questions that Goethe suggested that a critic should keep in mind: What did the artist set out to do? How well did he do it? And was it worth doing?

You may well ask why I believe that the ability to communicate with the public at large is so important. The philosopher, F.S.C. Northrup, explained in his book, *The Logic of the Sciences and the Humanities*:

...in a properly constructed society the philosophy which underlies the definition of one's economic doctrine, one's political doctrine, one's religious, poetic and artistic theory must be identical with the philosophy of the natural sciences...Such a philosophy of the good or the ideal in the social sciences and the humanities may be truly said to be an ideology which holds for everybody since,...it is...verified by the methods of natural science, which give the same result for one person that they give for another...

One tragedy of our civilization is that whereas natural science has gone forward, the separation of the departments of knowledge has obscured the essential connection between ideological or humanistic philosophy and the philosophy of natural science. As a consequence, our ideological philosophies have not changed along with changes in our philosophy of the natural sciences. Thus we find ourselves with sets of normative ideas grounded often in outmoded philosophies or in partial philosophies which get into conflict with each other. Hence the conflict of moral and social ideologies.

Professor Northrup was writing from Yale and some years ago. But more recently, too recently for me to document it, I heard that an historian of science at Harvard has argued that the ultimate test of any candidate for a degree should consist of the candidate's collaring the first ten people he meets at a convenient street corner and answering my three questions for them. If these ten people do not feel informed, convinced, and persuaded, the candidate remains a candidate. No degree should be forthcoming. For such an examination the candidate might be well advised to choose his street corner carefully.

I believe that isolating students in discipline groups will not serve to prepare them to solve the conflict described by Professor Northrup, nor will it prepare them for the street corner examination proposed by my temporarily anonymous source from Harvard.

To group students by discipline will mean that student experts, or near experts, in Physics will write for student and faculty experts in Physics; experts in Biology will write for biologists, and experts in Psychology for psychologists.

There is some merit in this. There are stylistic and organizational conventions in each of these fields that the student expert ought to learn if he is to communicate with others in his field. But these are, I am convinced, relatively minor matters which could be taken care of in one or two class

sessions or in a printed style manual to supplement Kate Turabian's *A Manual for Writers of Term Papers, Theses, and Dissertations*. The design of experiments which will persuade and the selection of measurements which will convince other experts in the same discipline should by now be well understood by the student.

The real problem with having student experts write for faculty experts in the same field is the same thing that is wrong with the traditional Freshman Composition course. *Practically no communication is involved* because the reading audience knows as much as, if not more than, the writer.

One of the principal axioms of information theory is that information is the *new*, the *unexpected*. If the reader already possesses the information, the message is merely redundant and a waste of time. And if we have an undergraduate expert writing for other student and faculty experts in the same discipline, it is difficult to see how the student writer can present new, or unexpected information to his readers--unless of course he is describing an original piece of research, which is seldom the case with undergraduates. And even if he is discussing original research, his expert audience will all be familiar with the paradigm, the theoretical foundation upon which the research was based, so he need not explain it. It is only readers outside the discipline who need to have the paradigm or theory explained to them.

This is, of course, especially evident in the physical sciences. As John Ziman says in his *Public Knowledge: The Social Dimension of Science*:

It is commonplace to remark that science has become remote from the layman, that no one condescends to explain it in simple language, that it is an esoteric cult...The information system of science works quite well for the accumulation of details, but is failing in the equally essential task of assembling those details into a comprehensible, analytically ordered and coherent system of ideas--a consensus--public knowledge.

But it is also evident in the social sciences, as John Kenneth Galbraith makes clear:

In the case of economics there are no important propositions that cannot be stated in plain language...

Complexity and obscurity have professional value--they are the academic equivalents of apprenticeship rules in the building trades. They exclude outsiders, keep down the competition, preserve the image of a privileged or priestly class. The man who makes thing clear is a scab. He is criticized less for his clarity than for his treachery.

Additionally and especially in the social sciences, much unclear writing is based on unclear or incomplete thought. It is possible with safety to be technically obscure about something you do not understand. Clarity thus exposes flaws in thought.

Now as every teacher has learned, your lack of clarity is revealed to you and you really only learn what you *don't* know about a subject when you try to teach it. My own mixed groups of engineering students often comment about this. A Chemical Engineer faced with the problem of explaining "fugacity" to Civil Engineers sometimes confesses that although he has been

confidently using the term for some time in conversations with other Chemical Engineers and in papers for Chemical Engineering classes, he now discovers that he only partly understands the concept. And this is of concern to him because he faced the sort of examination recommended by my anonymous source from Harvard--a public lecture and paper evaluated by External Examiners selected from the community.

Moreover, it is often the non-expert reader puzzling over an explanation who reveals, through his bewilderment, a hidden flaw in the expert's logic or terminology. Electrical Engineers often speak of signal amplification and the noise, or distortion, which increases with each successive stage of amplification. It is difficult for the students of Nursing, Pharmacy, or Natural Resources who often enroll in our technical writing courses to understand why merely increasing the strength, or voltage, of the signal should distort it, until the Electrical Engineer realizes that the signal itself is not increased. Instead it controls a larger voltage, which, in effect, makes an enlargement, or copy, of the original. Then it is not difficult to see why a copy of a copy of a copy should be fuzzier than the original.

There is another important advantage in asking the students to teach one another. They learn to see the world from different perspectives. Even the sciences can learn from one another. As Anatol Rapoport has pointed out, the various sciences--the physical, the biological, and the behavioral--have distinctly different sorts of theories. For example, how does the world look to a Materials and Metallurgical Engineer? I was helping one prepare a lecture once, but it was pretty dull, so I suggested that what his audience would really like would be to see the world as he saw it, through his eyes.

"What is it all made of?" I asked.

"That's easy," he replied. "Metals, ceramics, and polymers."

That stopped me, but I recovered quickly.

"My desk is made of metal; that I can see. And the walls are of cinder block, or ceramic, but how about trees, bushes, and other plant life?"

"Polymers," he retorted.

I reluctantly accepted this view, but I wasn't going to give up that easily.

"Well, how about the people who use your materials? What sorts of materials do they want from you? Aerospace Engineers, for example?"

"They want stuff that will withstand high temperatures and oxidation," he replied. "Rocket engines burn oxygen and hydrogen at very high temperatures and we must provide something that won't melt or get eaten away."

"And Chemical Engineers?" I asked.

"They want stuff that will withstand very low, cryogenic, temperatures and stuff that will withstand corrosion."

"I get it," I said. "They often work with salt solutions and sea water..."

"No! No!" he interrupted, "Blood."

"Blood?" I asked in astonishment.

"Sure," he said. "Blood is the most corrosive stuff we know. It is nearly impossible to find a material you can use in the human body that won't be corroded by the blood stream."

After this conversation the whole world looked different to me. I now see myself as a ceramic framework supporting a polymer bag full of corrosive juices. No wonder dogs bark at me.

I am sure that experts in other disciplines have equally interesting and intriguing views of the world we live in. Geology students have let me, and my students, view the world through their geological eyes, Nursing students through their eyes, Pharmacists through theirs, Foresters through theirs. And we have all profitted.

I should like, and I am sure that all of my students should like, to be shown the world of government as a Political Scientist sees it--John Fischer's essay, "The Unwritten Rules of American Politics" might serve as a model--and the world as a biologist sees it--here I should choose Lewis Thomas's *The Lives of a Cell* as a model--and so on through all the different fields of learning housed in a large cosmopolitan university.

I agree with J. Robert Oppenheimer's remarks at the Bi-Centennial of Columbia University "...it is proper to the role of the scientist that he not merely find new truth and communicate it to his fellows, but that he teach, that he try to bring the most honest and intelligible account of new knowledge to all who will try to learn."

But I would add that teaching is a proper role for the humanist as well. Many so-called humanists seem to me to be in love with abstractions instead of human beings. And as Anatol Rapoport has said, "...a flourishing terminology is more often a calamity in a rhetorically oriented discipline than an indication of its richness. Vagueness allows undisciplined proliferation and duplication, often providing a mask of erudition for lack of originality and insight. Not so in the exact sciences. There concepts hold their own only if they provide points of anchorage for genuine theorems, not simply for rhetorical speculation." So I want students of the humanities to try teaching students of science, and vice-versa.

There is so much to learn that I am--and I hope you are--insatiable. So let us all try to teach each other. We can only do this if we mix with other disciplines.

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